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WATER QUALITY IN MONTANA

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Prepared For

Environmental Protection Agency
Region VIII
Denver, Colorado

Pursuant to Public Law 92-500
Section 305(b)

Prepared By

Water Quality Bureau
Environmental Sciences Division
Department of Health and Environmental Sciences

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WATER QUALITY IN MONTANA

INTRODUCTION

This report was prepared by the Montana Water Quality Bureau using data gathered by state agencies. It was prepared pursuant to Section 305(b) of the 1972 Federal Water Pollution Control Act Amendments (PL 92-500). In 1960, over 1,000 miles of Montana streams were receiving raw sewage or industrial wastes which seriously affected beneficial uses. Since that time, state efforts have lowered the mileage affected to less than 250 miles in 1975 and will lower the total to less than 50 miles by 1977.

Through the permit program, point discharges will be controlled so that stream degradation from this source will be avoided in the future.

Pollution from non-point sources is currently Montana's greatest water quality problem.

For sustained production of Montana's 93+ million acres, man must adapt his enterprises to the natural environment. To do so he has to till, plant, cultivate and harvest his crops on land suitable for cultivation. He must also utilize land for grazing and timber production. Improper utilization of land not only decreases production but also increases possibility of water quality degradation. This degradation results from sediment discharges, salinity increases, temperature increases, flow changes and discharge of toxic agents such as pesticides, herbicides and mine wastes. Montana water pollution laws and regulations recognize the need to utilize our resources. They include:

Section 69-4801 (Public Policy of the State) states in part:

(2) It is not necessary that wastes be treated to a purer condition than the natural condition of the receiving stream. "Natural" refers to conditions or material present from runoff or percolation over which man has no control or from developed land where all reasonable land, soil and water conservation practices have been applied. Conditions resulting from dams of the effective date of this act are "natural."

Section 69-4802 (Definitions) states in part:

(5) "Pollution" means such contamination or other alteration of physical, chemical, or biological properties of any state waters as exceeds that permitted by Montana Water Quality Standards, including but not limited to standards relating to change in temperature, taste, color, turbidity or odor, or such discharge of any liquid, gaseous, solid, radioactive or other substance into any state waters as will or is

likely to create a nuisance or render such waters harmful, detrimental, or injurious to public health, recreation, safety or welfare or to livestock, wild animals, birds, fish or other wildlife, provided, however, that any discharge permitted by Montana Water Quality Standards is not pollution for the purposes of this chapter;

Section 69-4806 (Pollution Unlawful - Permits) states in part:

It is unlawful to:

(1) cause pollution as defined in 69-4802 (5), R.C.M., 1947, of any state waters or to place or cause to be placed any wastes in a location where they are likely to cause pollution of any state waters;

Montana Administrative Code 16-2.14(10)-S14480, Water Quality Standards:

General Water Quality Criteria:

(o) Pollution resulting from storm drainage from sewer discharges and non-point sources including irrigation practices, road building construction, logging practices, overgrazing, and other practices are to be eliminated or minimized as ordered by the department.

The key point in these laws and regulations is the definition of natural. This definition requires the Water Quality Bureau to have a defensible definition of all reasonable conservation practices and sufficient manpower to determine if in fact reasonable conservation practices are being used. The Water Quality Bureau does not have such definitions or manpower.

Due to the magnitude of the non-point problem in Montana and the lack of financial resources, minimal effort has been devoted to the problem. However, the emphasis of the Water Quality Bureau is shifting to non-point problems, and we are attempting to assess the nature and extent of our non-point pollution problem and develop control programs and evaluate costs and benefits for such a program.

SURVEILLANCE PROGRAM

A water quality monitoring program initiated to compile data for 303(e) basin water quality management plans was completed during fiscal year 1975. Approximately 450 samples were collected and analyzed for this program. Many of the water quality problem areas (Table 2) determined by the 303(e) basin management plans will be monitored by a permanent water quality network. This network will include 18 permanent Water Quality Bureau stations and 21 USGS stations. Chemical and physical data will be monitored quarterly at most stations. Conductivity will

be continually monitored during the summer months on Silver Bow Creek below the Warm Springs pond. Continuous temperature measurements will be taken on the Big Hole and Beaverhead Rivers during the low-flow, warm weather. The monitoring network will include 55 benthic stations. Water Quality Bureau personnel will collect and analyze at least one sample annually from each benthic station. These monitoring stations will be used to determine background and trend data. Sampling done for the 303(e) basin water quality plans determined which of Montana waters were not meeting the requirements for biosupport and recreational usage called for in the act.

Based on data gathered for the basin water quality management plans, a number of intensive surveys will be conducted. The number conducted will be determined by the funds available. These surveys will concentrate on water quality problem areas and will be used to determine the effects of pollution sources on water quality and to study and recommend methods for solving the problems.

The Department of Health and Environmental Sciences will have all major and minor discharges with the exception of approximately 30% of the irrigation districts under permit prior to fiscal year 1976. All major industrial discharges will be sampled or inspected at least two times during the fiscal year. All major agricultural discharges will be compliance inspected once during the fiscal year. Each of the 26 major municipal discharges will be compliance monitored at least once during the fiscal year.

QUALITY OF MONTANA STREAMS

An estimate of the miles of Montana streams degraded in each basin has been made (Table 1). This estimate is based on sampling done to prepare 303(e) basin plans, data available in the literature, and personal communications with U.S. Forest Service, Montana Fish and Game, and Montana Water Quality Bureau personnel. A breakdown of the streams affected in each basin is given in Table 2. Degradation in this sense does not necessarily mean a violation of Montana Water Quality Standards is occurring. Rather, it means that some beneficial use is being affected.

All streams not listed are assumed to meet the objectives of the act. Total mileage of Montana streams is unknown.

POINT SOURCE POLLUTION

Streams and segments of streams which do not meet 1983 goals due to point source pollution are listed in Tables 1 and 2. Miles of streams affected by point source discharges total 250 miles at the present time. These miles of streams are degraded by municipal discharges. By 1977, this mileage should decrease to 55 miles. At the present time, it is assumed that by 1983 no streams in Montana will be degraded by point sources.

TABLE 1

SUMMARY OF DEGRADED MONTANA STREAMS BY BASIN AND CAUSES (IN MILES)

	SEDIMENT	TEMPERATURE	DEWATERING	SALTS	NUTRIENTS	COLIFORMS	LOW DISSOLVED OXYGEN	ACID MINE WATER AND TOXIC METALS	OIL & GREASE, PHENOLS, COLOR	ARSENIC AND FLUORIDE FROM YNP	MISCELLANEOUS	TOTAL MILES DEGRADED IN THE BASIN	TOTAL MILES DEGRADED IN THE BASIN BY POINT-SOURCE
UPPER MISSOURI	500*	128*	128*		20*	1 40*		20		126		810	20
MISSOURI-SUN-SMITH	170*	20*	60*		12*	2 80*		55				380	75
MARIAS	216*	186*	261*	125*		9			7		6 (NH_3 from sewage)	440	22
MIDDLE MISSOURI	180*			195*	60*	11*						230	0
MILK	42*					3 104*	24					150	<80
LOWER MISSOURI				250*		70*						250	0
MUSSELSHELL	300*	300*	300*	300*	300*	4 3*						300	3
UPPER YELLOWSTONE	80					25*		35	25*	61		200	?
MIDDLE YELLOWSTONE	150*			86*								150	0
LOWER YELLOWSTONE	?											?	0
LITTLE MISSOURI						?						?	?

	SEDIMENT	TEMPERATURE	DEWATERING	SALTS	NUTRIENTS	COLIFORMS	LOW DISSOLVED OXYGEN	ACID MINE WATER AND TOXIC METALS	OIL & GREASE, PHENOLS, COLOR	ARSENIC AND FLUORIDE FROM YNP	MISCELLANEOUS	TOTAL MILES DEGRADED IN THE BASIN	TOTAL MILES DEGRADED IN THE BASIN BY POINT-SOURCE
UPPER CLARK FORK	75*		110*		60*		80	84*				360	0
LOWER CLARK FORK	68*					20*			4		2 (N_2 from dams)	155	43
FLATHEAD	50				30*	5 50*					5 (flow & T° fluct. from dam)	110	8
KOOTENAI	12*										50 (N_2 from Libby Dam)	60	0
ST. MARY'S												?	?
TOTAL	1,830	630	830	960	480	410	100	160	35	187	63	3,500	250

* indicates overlap of degradation causes
? status unknown

1. Construction has started which should correct 15 miles.
2. Construction has started which should correct 76 miles.
3. Construction has started which should correct 80 miles.
4. Construction has started which should correct 3 miles.
5. Construction has started which should correct 30 miles.

200 miles.

TABLE 2

MONTANA WATERS NOT MEETING THE OBJECTIVES OF PUBLIC LAW 92-500

UPPER MISSOURI BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
Boulder River from Basin to Boulder	7	NP	6N5W18	6N4W32	Toxic metals from past mining activity	1
High Ore Creek from Comet Mine to Boulder River	6	NP	7N5W36	6N5W22	Toxic metals from past mining activity	1
Cataract Creek from Uncle Sam Gulch to Boulder River	6	NP	7N5W33	6N5W16	Toxic metals from past mining activity	1
Big Hole River from Melrose to Jefferson River	27	NP	2S9W26	3S6W15	Elevated temperatures and dewatering caused by agricultural activity	1
Beaverhead River from Dillon downstream	25	NP	6S8W7	3S6W15	Elevated temperatures and dewatering caused by agricultural activity	1
Jefferson River to Three Forks	76	NP	3S6W15	2N2E30	Elevated temperatures and dewatering caused by agricultural activity	1
Red Rock River	60	NP	14S2W1	10N10W	Sediment caused by poor land use practices	1
West Gallatin River below Taylor Fork	80	NP	9S4E	2N3E	Dewatering caused by agricultural activity and natural sediment aggravated by poor land use practices	1
Ruby River	100	NP	10S3W	4S6W4	Sediment caused by poor land use practices	1

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
Muddy Creek and Big Sheep Creek	19	NP	13S8W	13S8W	Sediment caused by poor land use practices	1
West Fork Madison River	18	NP	12S1W	11S1E	Sediment caused by poor land use practices	1
Madison River from Yellowstone National Park downstream to Three Forks	126	NP	13S5E	2N2E	High levels of fluoride and arsenic caused by non-point thermal discharges in Yellowstone National Park	1
Long Creek	10	NP	12S4W	14S4W	Sediment caused by poor land use practices	2
Hyalite Creek	30	NP	4S6E	1S5E	Sediments originating from logging practices and in the lower five miles coliforms from non-point sources	1
Sourdough Creek	20	NP	3S6E	2S6E	Sediments from logging practices and in the lower five miles coliforms from non-point sources	2
Portal Creek	5	NP	6S5E	6S4E	Sediments from logging practices	1
Squaw Creek	10	NP	5S6E	4S4E	Sediments from logging practices	1
Baker Creek	10	NP	1S3E	1N3E	Sediment and nutrients from agricultural practices	3
Camp Creek	10	NP	2S3E	1N3E	Sediments and nutrients from agricultural practices	3
Rae Creek	10	NP	1N2E	2N2E	Sediments and nutrients from agricultural practices	2

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
Taylor Fork of the W. Gallatin River	15	NP	9S2E	9S4E	Sediments originating from natural causes and overgrazing	1
Dry Creek	10	NP	3N5E	1N4E	Sediments from agricultural practices	1
Jefferson River for varying distance below Three Forks	4	P	3N1E24DDD		Coliforms from Three Forks STP	1
Irrigation ditch and on occasion, an undetermined section of the East Gallatin River below Manhattan	?	P	1N3E3		Coliforms from Manhattan STP	1
Madison River below Ennis	1	P	5S1W33DDB		Coliforms from Ennis STP	1
Little Indian Creek below Sheridan	3	P	4S4W18C		Coliforms from Sheridan STP	1
Boulder River below Boulder	4	P	6N4W33DCA		Coliforms from Boulder STP and state facilities	1
Side channel of Jefferson River below Whitehall	1	P	1N4W		Coliforms from Whitehall STP	1
Beaverhead River below Dillon	3	P	7S8W8CB		Coliforms from Dillon STP	1
East Gallatin Bozeman to mouth	15 20	P NP	2S5E	1N5E	Coliforms from non-point sources and ammonia from Bozeman STP and sediments from poor land use practices	1,2
Grasshopper Creek below Bannack	15	NP	8S11W	8S10W	Sediment due to past mining activities	1

MISSOURI SUN SMITH BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
Spring Creek and an undetermined distance downstream on Prickly Pear Creek	6	NP	4N7W11		Metals due to past mining activities	4
Dry Fork of Belt Creek and Belt Creek below the Dry Fork	25	NP	15N8E	18N6E	Metals and acid from past mining activities	4
Sand Coulee Creek	10	NP	18N5E	20N3E	Metals and acid from past mining activities	4
Muddy Creek and the Sun River below Muddy Creek and the Missouri River from the Sun River to Fort Benton	70	NP	22N1W	24N8E	Sediments due to poor land use practices	4
Missouri River below Townsend	1	P	7N2E		Coliforms from Townsend STP	4
Prickly Pear Creek below Helena sewage treatment plant	6	P	11S3W		Coliforms and low dissolved oxygen due to the sewage discharge from Helena STP	4
Missouri from Great Falls to Fort Benton	40	P	20N3E		Coliforms due to Great Falls sewage treatment plant and low dissolved oxygen near sewage treatment plant	4
Smith River below Hound Creek	30	NP	20N3E	24N8E	Natural sediments aggravated by poor land use practices	4

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
Battle Creek	15	NP	7N6E	6N6E	Sediment from poor land use practices	4
Hay Creek	3	NP	6N5E	6N6E	Sediment from poor land use practices	4
Faulkner Creek	5	NP	6N5E	6N6E	Sediment from poor land use practices	4
Newland Creek	15	NP	11N7E	10N5E	Sediment from poor land use practices and hydraulic overloading caused by agricultural water diversion	4
Sheep Creek	15	NP	12N7E	12N4E	Dewatering caused by agricultural diversion	4
Middle Fork Sixteenmile Creek	3	NP	4N5E	4N5E	Sediment caused by poor land use practices	2
Deerborn River below Flat Creek and Flat Creek	15	NP	18N4W	16N2W	Sediment caused by poor land use practices	2,5
Little Prickly Pear Creek above Lyons Creek	3	NP	13N4W	13N4W	Dewatering by agricultural practices	2
Prickly Pear Creek below East Helena	10	NP	10N3W	11N3W	Dewatering by agricultural practices	4
Tenmile Creek	15	NP	10N4W	11N3W	Dewatering by agricultural practices and municipal water withdrawals	2
Confederate Creek	6	NP	9N2E	9N2E	Physical loss of stream channel and sediment caused by mining activity	4

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
Crow Creek	10	NP	5S1E	5S2E	Dewatering and nutrients from agricultural practices	4
Deep Creek	6	NP	6N2E	6N2E	Dewatering by agricultural practices	2
Trout Creek	5	NP	11N1W	11N2W	Coliforms from non-point sources	2
South Fork of the Smith River	20	NP	7N8E	9N6E	Sediments and temperature caused by poor land use practices	2
Warm Springs Creek	9	NP	4N1E	5N2E	Nutrients and sediments caused by agricultural practices	4
Spring Branch Creek	3	NP	5N1E	5N2E	Sediments and nutrients caused by agricultural practices	4

LOWER MISSOURI BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problems	Reference
Redwater Creek below Circle	80	NP	18N47E	27N50E	Natural salts, aggravated by poor land use practices	6
Muddy Creek below Reserve	70	NP	32N55E	28N55E	Coliforms and salts from poor land use practices	6
Poplar River below and including the East Fork	100	NP	37N48E	27N50E	Natural salts which may be aggravated by future coal mining in Canada	7

MILK RIVER BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problems	Reference
Milk River from Canada to Fresno Reservoir	24	NP	37N9E4	35N12E10	Sediment and coliforms due to poor land use practices	8
Big Sandy Creek	18	NP	30N13E33	32N15E4	Sediment due to poor land use practices	8
Lodge Creek	24	NP	37N15E12	33N19E26	Low dissolved oxygen in the entire reach - cause unknown	8
Milk River below Hinsdale	80 ?	NP P	31N36E33	27N42E32	High in turbidity and fecal coliforms due to inadequate sewage treatment at Hinsdale and Glasgow, and poor land use practices	8
Sage Creek	70	NP	34N10E	30N13E	Sediment from poor land use practices	8

MARIAS RIVER BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problems	Reference
Deep Creek above Choteau	6	NP	23N5W	23N5W	Dewatering caused by agricultural practices	9
Teton River to Spring Coulee	70	NP	23N5W	24N03	Dewatering caused by agricultural practices	9
Teton River from Spring Coulee to Loma	115	NP	24N03W04	25N09E	Elevated temperatures, dewatering and salts caused by agricultural practices	9
Spring Coulee	7	P	33N4W	33N3W	Phenols from Westco Oil Refinery	9
Cottonwood Creek and Marias River below Cottonwood Creek	70	NP	30N07E29	25N09E	Sediment, elevated temperatures and dewatering caused by agricultural practices	9
Marias above Cottonwood Creek	80	NP	32N05W	31N06E	Sediment caused by agricultural practices	9
Midvale Creek below East Glacier	9	P NP?	31N12W	31N11W	Coliforms from non-point sources and East Glacier sewage treatment plant	9
Two Medicine Creek below Badger Fisher Canal	36	NP	31N10W	31N05W	Sediment caused by agricultural practices	9
Birch Creek below Badger Fisher Canal	30	NP	29N08W	31N05W	Sediment caused by agricultural practices	9
Little Dry Coulee north of Conrad to the Dry Fork of Marias River	4	P	30N02W	31N02W36	Ammonia caused by Conrad STP	9

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Ending	Problem	Reference
Old Maid Coulee near Cut Bank	2	P	33N06W02	33N06W	Ammonia caused by Cut Bank STP	9
Hilger Coulee	9	NP		31N2W34	Natural salts aggravated by poor land use practices	9
Priest Butte Lake and all tributaries	-	NP	23N4W		Natural salts aggravated by poor land use practices	9
Alkali Lake northwest of Valier	-	NP	31N6W		Natural salts aggravated by poor land use practices	9

MUSSELSHELL BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
Musselshell River from Shawmut to the mouth	300	NP	7N18E30	19N29E12	High concentrations of nutrients, salts, and sediments, elevated temperatures, and physical loss of habitat caused by agricultural practices	10
Musselshell River below Lavina	3	P	6N22E		Coliforms from Lavina STP	10

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MIDDLE MISSOURI BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
Arrow Creek	30	NP	19N12E7	23N15E32	Natural salts and sediments aggravated by poor land use practices	11
Coffee Creek to Arrow Creek	15	NP	18N13E4		Natural salts and sediment aggravated by poor land use practices	11
Wolf Creek from below Denton to the Judith River	24	NP	18N14E17	21N16E2	Natural salts and sediment aggravated by poor land use practices	11
Dry Wolf Creek to Wolf Creek	10	NP	18N15E33	18N15E10	Natural salts and sediment aggravated by poor land use practices	11
Judith River from Hobson to Utica	8	NP	14N13E16	14N15E6	Coliforms, eutrophication, and salts apparently caused by non-point sources	11
Boyd Creek to Big Spring Creek	3	NP	15N19E18		Coliforms from non-point sources	11
Ross Fork Creek	24	NP	14N15E11	15N16E8	Eutrophication and high BOD caused by agricultural practices	11
Beaver Creek to Big Spring Creek	12	NP	15N17E21	16N17E28	Eutrophication caused by agricultural practices	11
Sage Creek from north of Danvers to the Judith River	9	NP	18N16E31	18N16E32	Natural salts aggravated by poor land use practices	11
Cottonwood Creek to Beaver Creek	12	NP	15N17E22		Eutrophication caused by poor land use practices	11
Judith River from Utica to the mouth	100	NP	14N13E16	23N16E26	Natural sediments and salts aggravated by poor land use practices	11

UPPER YELLOWSTONE BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problems	Reference
Gardiner River and the Yellowstone River for a varying distance downstream	60	NP	7E09S		Arsenic and fluoride caused by natural thermal discharges in Yellowstone National Park	12
Clarks Fork River to the Yellowstone River	80	NP	6S23E	2S24E	Sediments caused by poor land use practices	12
Yellowstone River from Laurel to a varying point below Billings	25	P & NP	2S24E		Oil and grease, and coliforms caused by discharges from Laurel sewage treatment plant, Northern Pacific discharge near Laurel and non-point sources in the Billings area	12
Upper Stillwater to Beehive	35	NP	8S14E	4S16E	Toxic metals from past mining activity	

MIDDLE YELLOWSTONE BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
Big Horn River below St. Xavier	63	NP	8S32E12	5S33E6	Natural sediment aggravated by poor land use practices	13
Soap Creek	10	NP	7S34E6	4S32E22	Natural sediments and salts aggravated by poor land use practices	13
Rotten Grass Creek	15	NP	4S29E24	4S32E15	Natural sediment and salts aggravated by poor land use practices	13
Beavais Creek	12	NP	9S36E30	8S55E	Natural sediments and salts aggravated by poor land use practices	13
Pass Creek	10	NP	9S37E29	36E6S18	Natural sediments and salts aggravated by poor land use practices	13
Owl Creek to the Little Big Horn River	15	NP	3S27E30	2N27E24	Natural sediments and salts aggravated by poor land use practices	13
Pryor Creek	24	NP	4S26E	2N27E	Natural sediments and salts aggravated by poor land use practices	13

LOWER YELLOWSTONE BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference

Non-point problem areas have not yet been identified. No point sources affecting water quality.

LITTLE MISSOURI BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
Little Missouri River at Alzada and an undetermined distance downstream	?	NP	9S59E24		Coliforms from non-point sources	15
Box Elder Creek near Mill Iron and an undetermined distance upstream	?	NP		1N61E17	Coliforms from non-point sources	15
Beaver Creek at Wibaux and an undetermined distance downstream	?	P & NP	14N59E1		Coliforms from non-point sources and Wibaux's sewage treatment plant	15

KOOTENAI BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
Kootenai River from Libby Dam to the Montana-Idaho border	50	NP	30N31W		Supersaturation of gases caused by Libby Dam	16
Fisher River	12	NP	29N29W	30N29W	Natural sediments aggravated by poor land use practices and construction	17

FLATHEAD BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
South Fork Flathead River from Hungry Horse Dam to main stream	5	NP	30N19W	30N20W	Temperature and streamflow fluctuations caused by releases from Libby Dam	18
Whitefish River from Whitefish to Flathead River	21	NP	31N22W	28N21W	Coliforms and eutrophication from Whitefish STP and non-point sources and dewatering by agricultural practices	18
Stillwater River	15	NP	32N23W	28N21W	Dewatering by agricultural practices	18
Ashley Creek above sewage treatment plant	8	P	27N22W	28N21W	Dewatering and coliforms from non-point sources above Kalispell STP and coliforms and low DO below the sewage treatment plant	18
and below the sewage treatment plant	7	NP				
Lake Mary Ronan	-	NP	25N22W		Eutrophication caused by poor land use practices	18
Echo Lake	-	NP	27N19W		Eutrophication caused by poor land use practices	18
Foy Lake	-	NP	28N22W		Eutrophication and salt buildup caused by natural dewatering	18
Red Meadow Creek	10	NP	35N23W	35N21W	Sediment and stream channel alterations due to logging practices	17
Whale Creek	10	NP	36N23W	36N22W	Sediment and stream channel alterations due to logging practices	17
Coal Creek	10	NP	34N22W	34N20W	Sediment and stream channel alterations due to logging practices	17
Big Creek	10	NP	32N22W	33N20W	Sediment and stream channel alterations due to logging practices	17
Canyon Creek	10	NP	32N21W	32N20W	Sediment and stream channel alterations due to logging practices	17

UPPER CLARK FORK BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
Silver Bow Creek and the Upper Clark Fork River to the confluence with the Little Black-foot River	60	NP	3N8W	9N10W	Metals and nutrients caused by past mining activities and municipal discharges from Butte	19
The Blackfoot River downstream to Lincoln	24	NP	16N7W	14N9W	Metals from past mining activities	19
Lander's Fork of the Blackfoot River	15	NP	16N8W	14N8W	Sediment from natural causes	19
Nevada Creek	15	NP	12N10W	14N11W	Sediment and dewatering from agricultural practices	2
North Fork of Blackfoot River	15	NP	16N10W	14N11W	Natural sediments	2
Union Creek	10	NP	13N15W	15N16W	Sediment from agricultural practices	19
Elk Creek	8	NP	13N14W	14N15W	Sediment from agricultural practices	2
Yourname Creek	2	NP	13N12W	13N12W	Dewatering by agricultural practices	2
Cottonwood Creek	8	NP	12N11W	13N11W	Sediment from agricultural practices	2
Douglas Creek	6	NP	12N12W	13N11W	Sediment from agricultural practices	2
Owl Creek	4	NP	16N15W	16N15W	Dewatering by agricultural diversion	19
Clark Fork River from Deer Lodge to Rock Creek	80	NP	7N9W	11N17W	Low dissolved oxygen due to eutrophication	24

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Ending	Problem	Reference
Placid Lake	-	NP	16N15W		Dewatering and eutrophication caused by agricultural diversion	19
Gold Creek	8	NP	15N17W	14N16W	Sediment from logging practices	2
Brock Creek	5	NP	10N10W	9N10W	Nutrient and sediments from phosphate mining activities	20
Flint Creek below Georgetown Lake	2	NP	15N13W	6N14W	H_2S, low dissolved oxygen from the lake discharge	2
Georgetown Lake	-	NP	5N13W		Eutrophication, natural, aggravated by poor land use practices	21
Dempsey Creek	15	NP	7N11W	6N9W	Dewatering by agricultural practices	22
Lower Warm Springs Creek	8	NP	4N11W	5N9W	Dewatering by agricultural practices	22
Racetrack Creek	10	NP	6N11W	6N9W	Dewatering by agricultural practices	22
Mill Creek	10	NP	4N11W	4N10W	Dewatering by agricultural practices	22
Willow Creek	10	NP	4N10W	4N10W	Dewatering by agricultural practices	22
Brown's Gulch Creek	8	NP	N8W	5N9W	Dewatering by agricultural practices	22
Basin Creek	5	NP	2S7W	3S7W	Dewatering by agricultural practices	22
Blacktail Creek	5	NP	2S7W	3S7W	Dewatering by agricultural practices	22

LOWER CLARK FORK BASIN

Stream Segment	Miles Affected (Estimated)	Point or Non-Point Source (P or NP)	Grid Coordinates Beginning	Grid Coordinates Ending	Problem	Reference
West Fork of the Bitterroot River	18	NP	1S22W	2N20W	Sediments from poor land use practices	23
Bitterroot River below Hamilton	50	NP	6N21W		Dewatering and sediments from poor land use practices and possible coliforms from subdivisions near Missoula	23
Bitterroot River below Darby	3	P	3N21W		Coliforms from Darby STP	23
Bitterroot River below Stevensville	3	P	9N21W		Coliforms from Stevensville STP	23
Hot Springs Creek	10	P	21N24W	21N23W	Coliforms from Hot Springs STP	23
Little Bitterroot River	30	NP	24N24W	20N21W	Natural sediments aggravated by poor land use practices and dewatering by agricultural practices	23
Clark Fork River below Noxon, Rapids Dam and Cabinet Gorge Dam	2	NP	26N32W 28N25W		Supersaturation of gases caused by dam operation	17
McGregor Creek	2	NP	26N26W	26N26W	Sediments caused by construction activities and silvicultural practices	17
West Fork Thompson River	2	NP	23N28W	22N28W	Sediments derived from silvicultural practices	17
Prospect Creek	2	NP	21N29W		Sediments caused by construction activities and silvicultural practices	17

NON POINT SOURCE POLLUTION

Sediment is one of the best known non-point source pollutants in Montana. The Montana Soil and Water Conservation Needs Inventory of 1970 covered approximately 70% of the total acreage in Montana. The 65 million acres inventoried were classified as follows: cropland - 23%, range and pasture - 65%, woodland - 11%, other - 1%. This inventory did not include federal non-cropland, urban and buildup areas or water impoundments.

Of the cropland which was inventoried, 89% was dryland farming, 11% was irrigated. Soil erosion was a dominant problem on 59% of the dryland acres and 40% of the irrigated acres. Only 43% of the dryland acreage and 11% of the irrigated acres were treated with proper conservation practices. In the case of range and pasture, soil erosion was the dominant problem on 72% of the rangeland and 57% of the pasture. Only 42% of the rangeland was adequately treated, indicating that the range was in good to excellent condition and 38% of the pasture land was adequately treated. !?!

Of the forest and woodland area, 87% was commercial forest. Soil erosion was the dominant problem on 75% of the woodland area. Adequate treatment existed on 31% of the commercial forest and on 97% of the non-commercial forest. The general statement regarding adequate treatment on other land indicates that 45% of the acreage in this category had received adequate treatment.

A similar needs survey entitled Soil Erosion and Sedimentation on Federal Land was prepared by the Soil Conservation Service, U. S. Department of Agriculture, State of Montana, in 1968. This report indicates that 90% of the federal woodland is receiving adequate treatment, 33% of the federal range and pasture acreage is receiving adequate treatment, and 80% of the federally owned cropland is receiving adequate treatment. * //

Stream segments which are suffering from excessive sediment are listed in Table 2 by drainage basin. An estimate of total stream miles degraded by sediment in Montana is given in Table 1. Much of the sediment in the Clarks Fork of the Yellowstone and Muddy Creek, a tributary of the Sun River, is known to result from agricultural practices. Even in these two cases, it is not known how much results from unreasonable conservation practices. Many other streams also suffer from excessive sediment and generally even less is known of the status of conservation measures in these cases.

Approximately 260,000 acres of land have been affected by saline seeps in Montana. Salinity problems have been identified on the Musselshell, Teton and Judith Rivers and on Redwater, Arrow and Coffee Creeks, as well as many other creeks, Tables 1 and 2. The total impact of salinity increases on Montana waters is not known. Neither is the extent to which salinity increases result from unreasonable conservation measures.

The Big Hole, Beaverhead, and Jefferson Rivers are examples of rivers which suffer from increased temperatures. Some of the increase is probably due to irrigation returns. However, much of the increase may be due to reduced flows resulting from irrigation withdrawals. Many other streams also suffer from irrigation withdrawals which in some cases result in complete dewatering, Tables 1 and 2. Dewatering as such is not covered in our control programs. In theory, Section 89-890, Reservation of Waters covers detrimental impacts of flow changes. This section states in part: (1) The state or any political subdivision or agency thereof, or the United States or any agency thereof, may apply to the Board to reserve waters for existing or future beneficial uses, or to maintain a minimum flow level or quality of water throughout the year or at such period or such length of time as the Board designates. (3) The Board may not adopt an order reserving water unless the applicant establishes to the satisfaction of the Board:

reservation of waters

(a) the purpose of the reservation,

(b) the need for the reservation,

(c) the amount of water necessary for the purpose of the reservation,

(d) that the reservation is in the public interest.

(5) A reservation under this section shall not affect any rights in existence when the order reserving waters is adopted.

Requirement (3)(c) would require funding far in excess of present levels even if water remained to be reserved (Provision 5). In fact, most Montana waters are probably over appropriated. Thus, there are two possibilities:

1. Buy water rights on each stream, or

2. Accept the permanent degradation of many aquatic ecosystems.

Because of the tremendous cost and political and social implications of buying water rights, these two possibilities are actually reduced to the latter. Nevertheless, some streams such as the Beaverhead and Big Hole Rivers could possibly be saved as fishing streams if we had the funds necessary to reserve flows.

24 fish kills have been documented since 1968; at least six of these have been caused by pesticides and herbicides. Since these kills have generally resulted from accidental introductions, their control is very difficult. Efforts are made to publicize all such spills to help educate the public. Although all commercial applicators of pesticides and herbicides must be licensed and knowledgable, the damaging spills have usually resulted from private applications.

About 185 miles of Montana streams are degraded by mining wastes. About 80 of these miles are below Butte and result from the deposition of

mining and milling wastes in and adjacent to the stream channel. Input of these wastes has stopped, but many years will be required for the streams to completely recover. Considerable recovery has already occurred as the effects in the past were evident for at least 150 miles downstream. At present, there are no practical means available to restore the streams damaged by mining wastes.

The Madison, Gardner and Upper Yellowstone Rivers (about 190 miles) do not and cannot meet the U. S. Public Health Service Drinking Water Standards because of high levels of arsenic and fluoride caused by non-point discharges in Yellowstone National Park.

COSTS VERSUS BENEFITS

Costs for correcting municipal wastewater treatment facilities which are likely to affect water quality in each basin are shown in Table 3. These costs total about $19 million. This cost includes chlorination costs for several small systems which may cause detectable increases in coliform densities in the receiving waters. Montana needs $111 million to meet the requirements for secondary treatment as defined by the Administrator (Table 4). This cost includes chlorination for all municipal wastewater facilities.

In 1960, there were about 1,040 miles of streams degraded by point sources in Montana. Sections of these streams were not usable for recreation and some were not safe for drinking water (Table 5). As an example, taste and odor problems were experienced in the entire Yellowstone River below Billings. Now only 250 miles of streams in the state are affected by point sources and within two years, only 50 miles will be affected. This improvement was brought about at considerable cost, amount unknown, and to the great benefit of municipalities and the public.

TABLE 3

COSTS TO CORRECT MUNICIPAL DISCHARGES WHICH DEGRADE WATER QUALITY BY BASIN

	(1,000's of $)
UPPER MISSOURI	
Three Forks	163.5
Manhattan	150
Ennis	110
Sheridan	150
Boulder	187.5
Whitehall	170
Dillon	330
Bozeman	4,200
	5,461
MISSOURI-SUN-SMITH	
Townsend	1,025
Helena	in construction
Great Falls	3,860
	4,885
MIDDLE MISSOURI	
Lewistown	1,310
Utica	no system
Hobson	100
	1,410
LOWER MISSOURI	
-	
MILK	
Hinsdale	in construction
Glasgow	" "
Havre	" "
MARIAS	
East Glacier	160
Cut Bank (NH_3)	?
Conrad (NH_3)	320
Choteau	100
	580

TABLE 3 (continued)

	(1,000's of $)
MUSSELSHELL	
Lavina	10
Harlowton	95
	105
UPPER YELLOWSTONE	
Laurel	1,600
Billings (in construction, additional needed improvements will cost)	180
	1,780
MIDDLE YELLOWSTONE	?
LOWER YELLOWSTONE	
Wibaux	needs better operation
KOOTENAI	
Eureka	232.5
	232.5
FLATHEAD	
Kalispell	in construction
Whitefish	1,150
	1,150
UPPER CLARK FORK	
Butte	2,475
	2,475
LOWER CLARK FORK	
Darby	100
Stevensille	195
Ronan	250
Hot Springs	100
St. Ignatius	150
Hamilton	900
	1,445

These are over estimates as most of these sewage treatment plants would only need chlorination to meet Water Quality Standards

TOTAL $19,523,500

TABLE 4

ESTIMATED FUNDS NECESSARY TO ACHIEVE SECONDARY TREATMENT IN MONTANA

	(1973 dollars)
Upgarding to secondary treatment	$ 40,000,000
Correction of infiltration/inflow sewer problems.	4,000,000
Major rehabilitation of existing sewers	2,000,000
New collector sewers	22,000,000
New interceptor sewers	35,000,000
Separation of storm-sanitary sewers . . .	8,000,000
TOTAL	$111,000,000

TABLE 5

MILES OF MONTANA STREAMS IN EACH BASIN
WHICH WERE DEGRADED BY POINT SOURCES IN 1960 AND IN 1975

	1960		1975	
	Miles	References	Miles	References (See Table 2)
Upper Missouri	71	25	20	
Sun-Missouri-Smith	61	25	75	
Middle Missouri	15	25	0	
Lower Missouri	2	25	0	
Marias	7	25	22	
Milk	123	25	>80	
Upper Yellowstone	35	26	? (>20)	
Middle Yellowstone	160	26	0	
Lower Yellowstone	160	26	0	
Little Missouri	?	--	?	
Upper Clark Fork	155	27	0	
Lower Clark Fork	153	27	43	
Flathead	31	27	8	
Kootenai	65	27	0	
Musselshell	6	25	3	
St. Mary's	?	--	?	
	1,044		251	

INDUSTRIAL COSTS

Westco Refinery's discharge is presently affecting a small stream for about seven miles below the refinery near Cut Bank. This is a very minor problem and will be corrected when they meet the permit conditions. Costs for this correction are unknown. The Hoerner-Waldorf discharge in Missoula has caused the stream to exceed Montana State Water Quality Standards for color. However, the major problem with this industry is air pollution, and it is not known how they will meet the color standard at this time; therefore, cost has not been determined. Burlington-Northern discharge at Laurel causes the Yellowstone River to exceed water quality standards for oil and grease. However, the oil and grease does not come from Burlington Northern but is seepage into their discharge lines from the groundwater. Because this results from groundwater contamination, the discharge should be allowed to flow to cleanse the groundwater. Affixing responsibility for the contaminated groundwater and assigning treatment costs is impractical at this time.

The costs for Montana industries to achieve best practicable treatment as defined by the act is unknown. Many of these industries do not know what best practicable treatment consists of and because of time constraints on our part, we have not determined an approximate cost. The same considerations apply to best available treatment. The cost for zero discharge is also unknown. As these three advanced stages of treatment are not necessary to protect water quality, whatever the cost is, it is excessive.

The cost and benefits of meeting the 1983 goals is not known. Before we can define costs, we must define areas which do not meet water quality standards as defined under the non-point section; then we can figure these costs on a basin-by-basin basis, assign priorities and calculate actual benefits. This will also enable us to determine where it is not practical to meet these standards

However, we do know that it is not feasible to meet water quality standards on the Yellowstone and Madison Rivers due to the source of these pollutants.

REFERENCES

1. Water Quality Inventory and Management Plan, Upper Missouri Basin, Montana by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1975.

2. Robert Braico, Montana Water Quality Bureau, personal communication, 1974.

3. Gallatin Basin Waste Allocation Study prepared by Stewart, D.G., Wright, J. D., Schillinger, J.E., Bissonnette, G. K., and James J. Jezeski, July 25, 1974, Department of Microbiology, Montana State University, Bozeman.

4. Water Quality Inventory and Management Plan, Missouri-Sun-Smith River Basin, Montana by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1974.

5. Wipperman, Al. Montana Fish and Game Department, personal communication, 1974.

6. Water Quality Inventory and Management Plan, Lower Missouri Basin, Montana by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1975.

7. Sprague, D. J., Soil Conservation Service, Scobey, Montana, personal communication, 1974.

8. Water Quality Inventory and Management Plan, Milk River Basin, Montana by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1974.

9. Water Quality Inventory and Management Plan, Marias Basin, Montana by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1975.

10. Water Quality Inventory and Management Plan, Musselshell Basin, Montana by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1975.

11. Water Quality Inventory and Management Plan, Middle Missouri Basin, Montana by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1975.

12. Water Quality Inventory and Management Plan, Upper Yellowstone Basin, Montana by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1975.

13. Water Quality Inventory and Management Plan, Middle Yellowstone Basin, Montana by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1975.

14. Water Quality Inventory and Management Plan, Lower Yellowstone Basin, Montana, by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1975.

15. Water Quality Inventory and Management Plan, Little Missouri Basin, Montana, by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1974.

16. Water Quality Inventory and Management Plan, Kootenai Basin, Montana, by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1974.

17. Schumacher, Bob. Regional Fish Manager, Montana Fish and Game, personal communication, 1974.

18. Water Quality Inventory and Management Plan, Flathead Basin, Montana, by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1975.

19. Water Quality Inventory and Management Plan, Upper Clark Fork Basin, Montana, by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1975.

20. Horpestad, A. A., Limnologist, Water Quality Bureau, personal communication, 1975.

21. Wright, J. C., Botony Professor, Montana State University, personal communication, 1975.

22. Botz, M. K., Montana Water Quality Bureau, personal communication, 1975.

23. Water Quality Inventory and Management Plan, Lower Clark Fork Basin, Montana, by Water Quality Bureau, Environmental Sciences Division, Montana Department of Health and Environmental Sciences, 1975.

24. Braico, R. D., Dissolved Oxygen and Temperature Diurnal Variations in the Clark Fork River Between Deer Lodge and Superior, Montana, August 2-3, 1973 (Unpublished Report, Montana Water Quality Bureau files).

25. Water Pollution in the Missouri River Drainage in Montana, Montana State Board of Health, 1960.

26. Pollution of the Yellowstone River as Related to Taste and Odor Problems in Municipal Water Supplies in Montana and North Dakota, Montana State Board of Health, North Dakota State Department of Health, and Department of Health, Education, and Welfare, July 1956.

27. Survey Report, John C. Spindler, Aquatic Biologist, Division of Environmental Sanitation, Montana State Board of Health, 1957.